PANEL SESSIONS

Departments of Commerce and Defense Weather Services and Capabilities for Surface Transportation Decision Support

Chair: Ms. Barbara Semedo, *Director*
Public and Constituent Affairs, National Oceanic and Atmospheric Administration

Synopsis

This panel consisted of Federal environmental support agencies chartered with providing weather products to a wide-range of customers with divergent needs. Regardless of the consumers, several fundamental core themes were shared: resolution, tailoring, coordination, standardization, decision-thresholds, and liabilities/believability.

- Increasing the temporal and spatial resolution. Are the customers' environmental decision thresholds being adequately addressed? Timeliness addresses several issues; e.g., time from creation of the environmental support product to the actual delivery to an end-customer and the amount of advance warning that can be expected given the model time and physics constraints. Atmospheric model runs are (as a rule) created every 12 hours with forecasts through 7-10 days. Development of atmospheric models from the coarser global scales to a more refined, granular mesoscale/local depiction is critical in resolving those weather elements pertinent to surface transportation.

- Developing tailored product suites with particular attention to visualization techniques, etc. Currently the full-spectrum weather support includes observations, forecasts, warnings, and climatology. The providers are charged with producing the necessary information support in an eye-catching, physically consistent, legitimate manner. Creation of tailored-decision aids (TDAs) that translate weather events into recommended action is the goal.

- Increasing the coordination between providers and users to create capability and technology transfer leverages. Coordination between Federal and private/public sectors creates an R&D culture that results in mutual and often free exchange of scientific discovery. The transition from basic research to operational application is being strengthened by this collaboration.

- Standardization. National and international standards are an absolute necessity. In this instance, environmental standards encompass creation, establishment, maintenance and archive of observations, model output, product output (message text, 2-D and 3-D animation), and terminology and graphics criterion. Communication standards, i.e., protocols, packet compression, compression algorithms, transmission and reception speeds, to name a few, compound the complexity of data/product delivery.

- Clientele defined "thresholds" for environmental support initiation. Several weather forecasts and events trigger subsequent action and reaction by the transportation community.

    - Temperature. Pavement temperature is critical in determining the use of the appropriate chemical to disrupt the development of ice or melt snow. Sub-surface temperature is relevant for roadway thaws and freezes. Temperature, coupled with wind speed, determines exposure limitations.

    - Hydrometeors. Any type of liquid precipitation given the right circumstances, i.e., accumulation, rate, intensity, etc. especially freezing precipitation.

    - Wind-direction and speed. Wind direction and speed are factors in vehicle stability, drifting snow, blowing dust, and sand.

    - Severe weather events-thunderstorms, tornadoes, hurricanes.

    - Black ice accretion.

    - Visibility-Reductions caused by hydrometeors or lithometeors.

    These environmental "triggers" are extremely location and event (time and rate) driven; e.g., snow accumulation in excess of four inches over two days may cause transportation woes in the metropolitan and urban south, but the same event may not be a safe transportation factor in the northern tier states.

- Liabilities/Believability. In order to engender trust, credibility is the product litmus test. Credibility is generated by creating an historical track record of accurate and timely forecasts. Only then, does product liability become a non-issue. To that end, environmental product quality control, training and certification standards are paramount.

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Commercial Weather Information Production Capabilities and Services

Chair: Ms. Julie Campbell, *President*
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Synopsis

Issues and Perspectives

1. Panel achieved the objective of expanding the awareness of the private sector capabilities and roles in providing weather products, services, and capabilities. Panel members identified new products address surface transportation needs, especially in the context of where the private sector can support the public sector and the specialized needs of transportation users.

2. The private and public roles in the dissemination of information was explored:
   - NWS addressing data format issues
   - Synchronicity among the media--simple, consistent, concise and clear messages transmitted to public and how much is too much information

3. The nature of the media "business of weather information" and the media constraints:
   - ability to deploy meso-nets of data
   - ability to invest in products
   - reliance on the private sector value-added companies to develop products specifically for use by the media
   - reliance on the NWS for data and responsibility to disseminate warnings accurately
   - the nature of a self-assessment on performance during severe weather coverage

4. Market research impacts on:
   - product development
   - emphasis on coverage
   - opportunities and constraints of the Internet as a delivery mechanism
   - trends defining product and service delivery
   - lifestyle demands driving product and service delivery
   - sophistication levels of each audience

5. "Official" versus emerging observing systems
   - needs for more meso-net type systems
   - diversity in sources of deployment--state, local, private
   - standardization of observations, data formats, etc.
   - integrating the non-weather systems into "information", such as the traffic cameras for weather news segments
   - standardization of dissemination and "ownership" or proprietary data sources

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Federal Agency Weather Information Needs

Chair: Mr. James Washington, *Director*
Air Traffic System Requirements Service, Department of Transportation-Federal Highway Administration

Synopsis

This panel consisted of Federal agencies whose mission charter consists of providing transportation services (advocacy and liaison) with emphasis on safety of operation. These agencies are dependent on other providers for weather information but are subsequently responsible for providing decision support to their consumers. There were several common surface transportation recurring themes, specifically, users/providers information exchange, research and development (R&D), standards, timely and accurate environmental information, and tailored-decision aids.

- Users/providers information exchange. Users need to know what product suites are available and their limitations to formalize an operations plan. Also, users need to provide specific environmental thresholds (weather element factors) to the weather support provider so tailored product groups can be created.

- Research and development. FHWA conducts R&D in conjunction with state Department of Transportation (DOT). Also, FHWA has begun a review process to identify user requirements to be addressed by the environmental support providers.

- Standards. Development of the Road Weather Information System (RWIS) and commercial environmental information systems are not readily integrated into a national database. This information, some proprietary, needs to adhere to national and international observation and data dissemination standards.

- Timely and accurate environmental information. Inherent in all decision-making is the timely processing of critical information. When weather affects surface transportation, the ability to respond is determined by having the right forecast or observation at the critical moment in the decision process. Weather providers need to create weather products that provide this information in a manner consistent with the needs of the end user. The end user desires finer resolution (neighborhood vice city), accuracy (freezing rain vice snow), and timely (minutes vice hours) forecasts.

- Tailored-decision aids. TDAs need to be based on specific user requirements. R&D efforts have identified several weather elements that play a role in surface transportation, i.e.,
  - Temperature.
  - Precipitation, especially freezing precipitation.
  - Wind-wind speed and direction.
  - Severe weather events-thunderstorms, tornadoes, hurricanes.
  - Visibility.

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State and Urban/Rural Transit Weather Information Needs

Chair: Mr. Kenneth Kobetsky
American Association of State Highway and Transportation Officials

Synopsis

This panel consisted of state and local transit agencies whose mission statement is to move people and commodities consistently, economically and safely. The application is complex. These authorities are weather customers who must provide responsible decision support to their constituents and respond during weather-related emergencies. Some common surface transportation issues that were discussed: customer-defined decision thresholds, accuracy and timeliness of environmental support information, support providers and proprietary information, data exchange standardization (between public and private agencies and neighboring states), information dissemination mechanisms, development of plans and procedures, and assignment of specific roles (accountability and responsibility).

- Customer defined decision thresholds. Weather forecasts and observations trigger action and often reaction by transportation agencies.

  - Temperature. Extremes and changeover times are critical in determining the use of appropriate agents to prevent the development of ice or aid in snow depletion.

  - Precipitation. Any type of precipitation given the right circumstances, i.e., accumulation, rate, intensity, etc. especially freezing precipitation.

  These thresholds are extremely location and event (time and rate) driven.

- Accuracy and timeliness of environmental support information. Surface transportation needs require the best information possible in a timely manner. In addition, rapid refreshment rate is critical. When conditions change, are updates created rapidly and are the thresholds that would cause an update clearly defined?

- Support providers, proprietary information, data exchange standardization, and information dissemination mechanisms. Private and public sector vendors have generated new support applications and functions. These systems are playing an important role in the support structure for local and state officials. Concerns are rising over the ownership of the networked weather data and the ability to share this data with neighboring states and federal agencies without violating proprietary ownership.

Once the issue of ownership accountability is resolved, data and communications standards and reliability issues must be addressed before inclusion into a national/international network. Who sets the data exchange formats and standards? Most vendors have developed efficient network or Internet protocol data exchange routines but this data and mechanisms are exclusionary and do not address the World Meteorological Organization (WMO) or national standards. This is a critical data mining issue.

- Development of plans, procedures and assignment of specific roles. Coordination, prior planning, clearer definition of assigned responsibilities and designations of authority are events that must be exercised prior to a weather catastrophe. During the 1999 hurricane season, the largest non-war related evacuation took place due to Hurricane Floyd. Federal, state and local officials were overwhelmed by the magnitude of the task. Although some disaster evacuation plans had been commissioned years earlier, the application of those plans uncovered numerous inadequacies--lack of training, no rehearsal plan, incomplete coordination, strategy refreshment, and incomplete delegation of authority. The resolution of these issues at all levels of surface transportation must become a priority.

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Professional and Trade Organization Weather Information Needs

Chair: Mr. Kevin Hiett
American Automobile Association

Synopsis

This panel consisted of professional and trade organizations whose motivations share an economic component. Their environmental concerns are fundamental and highlight the conundrum faced by support providers and the professional trade decision-makers, namely, the goal of delivering goods--profitably and on-time. Certain weather-related losses are anticipated; but until those losses exceed an accepted loss-to-profit ratio, the trade organizations are not heralds of weather marketing change. However, each organization works at minimizing their "anticipated weather losses" by identifying those environmental parameters that affect their operations and pursuing those support agencies that can provide analyses and forecasts to mitigate the likely loss of operational assets.

- Environmental parameters.
  - Wind-direction and speed.
  - Temperature extremes.
  - Precipitation. Any type of liquid precipitation given the right circumstances, i.e., accumulation, rate, intensity, etc. especially freezing precipitation.
  - Visibility.

A summation credo…

> *"Our customers demand consistent, reliable, dependable service at a reasonable cost—weather is no excuse!"*

Panel Membership:

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Research/Technology Innovation and Decision Support

Chair: Dr. A.E. (Sandy) MacDonald
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Subpanel 1

Key Results

The successes of commercial R&D transition to surface transportation support applications validates the need, e.g., FORETELL, ATWIS, IRRIS. Utilities typical of these applications are:

- Communications via the Internet, cell phone or shareware networking software.
- A mesoscale, fine resolution atmospheric model is utilized for the weather forecast.
- Support information consists of road conditions, roadway observations, highway and railway infrastructure data, i.e., construction, roadway status and environmental information.

New technologies are being developed by monitoring current surface transportation practices; e.g., message signs, rural traffic management centers and thermal mapping. Testbeds for these technologies include Interstate-90 and Interstate-99.

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Research/Technology Innovation and Decision Support

Subpanel 2

Key Results

As new technologies, heretofore unrelated to surface transportation, evolve, they can be applied to solve some of the problems associated with surface transportation, specifically, communication. Digital audio broadcasting utilizing the current AM/FM bands may one day replace broadband emergency warning systems. In the near future, vehicles could be notified of hazards automatically if the appropriate equipment, such as GPS receivers and transponders, become standard equipment. One day, we could be sheltered by our own transportation flight plan similar to today's aviation flight plan.

R&D efforts, particularly NEXRAD R&D, will have a direct application to the Intelligent Transportation System (ITS). Travelers will routinely receive, in real-time, a display of severe weather.

Technology transfer from R&D takes too long to implement operationally. The process needs to be revamped to utilize cutting-edge technology. The National Innovation Process is an approach that compresses and reduces the implementation times for creative technology, thus, placing applications in the hands of the operator before the technology needs to be refreshed.

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